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The Effect of Board Structure on Stock Picking and Market Timing Abilities of the Egyptian Mutual Fund Managers: Evidence from Financial Crisis

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Abstract
This paper seeks to examine the effect of mutual fund governance on stock selection and market timing abilities. This paper applies a Structural Equation Modelling technique to solve the potential endogeneity problem between internal governance measures and stock selection and market timing. The main conclusion of this paper is to provide evidence through robust statistical analysis around the usefulness of governance attributes Egyptian mutual funds stock selection and market timing abilities. Accordingly, the financial crisis demonstrates a need to modify some recommendations contained in the OECD methodology for evaluating the implementation of the OECD Principles of Corporate Governance. This paper find that board size and proportion of independent directors is negatively associated with stock selection, and proportion of directors holding zero shares is positively associated with stock selection.
Keywords: Corporate Governance, Mutual Fund, Endogeneity.

1. Introduction

This study seeks to present a brief overview of the developments in the Egyptian mutual fund industry since the financial crisis of 2007, the broad developments show that while recovery in the industry post-crisis has been quite robust, a tendency towards risk aversion, akin to a global trend, has become visible with the mutual fund industry's asset base, resource mobilization and investment in capital markets increasingly leaning towards the most liquid asset classes.[1]

The global financial crisis has negatively been transmitted to the Egyptian economy particularly since mid-2008. The impact has been more pronounced on the real economy rather than the banking sector.[2] This is due to a number of factors most prominent of which is the limited integration of the Egyptian banking sector in the global financial market. Moreover, the Central Bank of Egypt has succeeded in reforming the sector since 2004 by consolidating the banks into large conglomerates; restructuring bank management; and getting rid of toxic debts. The Central Bank also introduces stringent rules of governance to guarantee the disciplined functioning of the system. Finally, the banking system has not been short of liquidity with the lending-to-deposit ratio not exceeding 53%, which is well within the safe boundaries compared to the rest of the world.

The global financial crisis unsurprisingly has an impact both on the amount of savings being channelled into mutual funds over the world, and on the distribution of resources among mutual fund classes embodying varying degrees of risk. Empirical evidence from across the globe confirms that there has been a movement away from riskier to less risky assets during the crisis and through the recovery period (Bose, 2012). Here looking at the broad developments in the Egyptian mutual fund industry, the industry's asset base is seen to be growing at phenomenal rates prior to the crisis; the post-crisis period provides an interesting timeframe to study the trends in the industry as this period is characterized by considerable variations in global and domestic economic and financial market conditions, as well as in policy regimes in Egypt.

The purpose of this paper is to examine the role of corporate governance and ownership in stock picking and market timing abilities. The rest of this paper is structured as follows: section 2 reviews the previous literature and empirical hypothesis on the relationship between mutual fund board structure and stock picking and market timing; section 3 discusses the econometric approach and data description; section 4 lays out the structural equation modelling analysis. Finally, section 5 presents research contributions and suggestions for future studies.

[1] Samir Radwan; ILO, SRO Cairo; April 2009.
[2] Mohamed Khalifa Ibrahim; The Effect of the Economic Crisis on Egypt's Economy; November 2011.

2. Literature Review and the Hypotheses

Unfortunately, most economists ignore individual feelings when analyzing financial crisis. They should take into account the normal thinking of individual investors, with its considerable irrational behaviors (Akerlof and Shiller, 2010). Overconfidence and representativeness are the main causes of psychological biases that influence the decision making of investors (Gilovich et al., 2002).

Lindlof and Taylor (2010) examine the effects of the financial crisis between January 2008 and June 2010 by Pew Research Centre with 2,967 respondents. They find that 62% of Americans reduced their spending since the crisis began in December 2007. Another comprehensive study of the effect of the financial crisis on households is a 2009 follow-up Federal Reserve Board study (Bricker et al., 2011) of families that collaborated in the 2007 Survey of Consumer Finances (SCF). They find that most families (63%) experienced losses in wealth. Additionally, O'Neill and Xiao (2012) examine the performance of 20 financial practices pre and post the financial crisis. The sample is divided into two sub periods pre- and post- December 31, 2007. After converting quiz items to three behavioural categories, scores for all three behaviours – budgeting, spending, and saving – are significantly higher after the financial crisis.

2.1 Role of Board of Directors on Stock Picking and Market Timing Abilities

Poor corporate governance has been suggested by academics as a key contributing factor to the recent crisis (Bebchuk et al., 2010; Blundell-Wignall et al., 2008; Cornett et al., 2010; Haspeslagh, 2010; Kirkpatrick, 2009; Moxey and Berendt, 2008; and Pirson and Turnbull, 201, Lewellyn and Muller-Kahle, 2012; Muller-Kahle and Lewellyn, 2011). Theoretically, McNulty et al. (2013) argue for the significance of board processes and their impact on financial risk supported by quantitative evidence. Through attention to the deeper social-psychological dynamics of collective board behaviour, they are afforded greater understanding of board functions and how risk management operates through the mechanism of the board (Boyd et al., 2011; Golden and Zajac, 2001; Hillman and Dalziel, 2003; Pearce and Zahra, 1991; and Zahra and Pearce, 1989). The evidence on the value of corporate governance during the crisis is derived from data on US financial companies (Balachandran et al., 2010; Bebchuk et al., 2010; Beltratti and Stulz, 2012; Cornett et al., 2010; Fahlenbrach and Stulz, 2011; Hagendorff and Vallascas, 2011; and Tung and Wang, 2012, (Ahrens et al., 2011).

Furthermore, McNulty et al. (2013) extend earlier work by providing evidence for UK firms. Similar to US firms, firms in the UK are significantly affected by the crisis and experience a considerable weakening of their balance sheets (Financial Times, 2008).[1] Practically, in the aftermath of the crisis, emphasis is given in the UK to the important role of boards in managing risk. Subsequently, the UK Corporate Governance Code has determined the responsibility of boards for effective risk management (Financial Reporting Council, 2010: Principle C.2).

2.2 Role of Ownership Structure on Stock Picking and Market Timing Abilities

Desender et al. (2013) develop a contingency approach to explain how firm ownership influences the monitoring function of the board measured as the magnitude of external audit fees contracted by the board. Analyses of data on Continental European companies find that while board independence and audit services are complementary when ownership is dispersed, this is not the case when ownership is concentrated suggesting that ownership concentration and board composition become substitutes in terms of monitoring management.

Furthermore, Erkens et al. (2012) investigate the influence of corporate governance on financial firms' performance during the 2007–2008 financial crisis, they find that firms with more independent boards and higher institutional ownership experienced worse stock returns during the crisis period. They suggest that this is because (1) firms with higher institutional ownership took more risk prior to the crisis, which resulted in larger shareholder losses during the crisis period, and (2) firms with more independent boards raised more equity capital during the crisis which led to a wealth transfer from existing shareholders to debt holders.

This paper examines two models proposed and tested in the literature to measure stock picking and market timing abilities of Egyptian fund managers which are: (1) Jensen (1968) model, and (2) Treynor and Mazuy (1966) model respectively. The study of the impact of corporate governance on portfolio selection and market timing is particularly valuable for various reasons (Lassoued and Elmir, 2012). Firstly, a large body of theoretical and empirical literature has shown that corporate governance mechanisms affect risk and return. In fact, many arguments demonstrate that board characteristics (Agrawal and Knoeber, 1996; and Chhaochharia and Grinstein, 2007), ownership structure (Holderness and Sheehan, 1988; and Holmström and Tirole, 1993), managerial compensation (Berger et al., 1997; and Cohen et al., 2002) and external control (Jensen and Ruback, 1983; and Gompers et al., 2003) help to explain risk and return. Secondly, governance quality seems to be a criterion used by sophisticated investors for their portfolio management (Cremers and Nair, 2005; Hooper et al., 2008; Leuz et al., 2010; Lassoued, 2010; Bushee et al., 2013).

[1] See "Analysts Hit the Books to Judge the Impact of Credit Crunch," *Financial Times*, August 6, 2008.

Consequently, when this research investigates the role of corporate governance mechanisms on stock picking and market timing abilities, endogeneity come from the powerful association between past values of the regressand (stock picking and market timing), and current values of the regressors (corporate governance structure) (Wintoki et al., 2012; Chandio, 2011; Klein & Zur, 2011; Westland, 2010; Hair et al., 2006). There are many methods of overcoming this; including Maximum likelihood (ML) and Ggeneralized Method of Moments (GMM). Although, GMM and ML is a general framework for deriving estimators, there is a difference between the assumptions of the two methods. ML estimators use assumptions about the specific families of distributions for the random variables to derive an objective function. It selects the parameters that are probably have generated the observed data, which can be proceeded by maximizing an objective function. GMM estimators use assumptions about the moments of the random variables to derive an objective function. The assumed moments of the random variables present population moment conditions, which can be achieved by minimizing an objective function. Accordingly, ML can be more efficient than GMM, because ML uses the entire distribution instead of uses specified moments only (Breitung and Lechner, 1995).

Therefore, this paper utilizes SEM which is a multivariate technique that allows us to estimate a system of equations. Structural Equation Models are often drawn as Path Diagrams. SEM is a Full Information Maximum Likelihood (FIML), which estimates all the equations and all the unknown parameters jointly and obtains robust findings, compared with GMM. Therefore, this study uses different independent variables to characterize the structure of the board as illustrated below:

Board size: as the most critical corporate governance mechanism, boards of directors play an important role in setting the strategic direction of an organization (Braun and Latham, 2007). Yet, no clear finding emerges from the literature regarding the effects of board size. One meta-analysis finds a positive relationship between board size and improves financial performance (Dalton et al., 1999), while other researchers cast doubt on this relationship (e.g., Bhagat and Black, 1999).

Golden and Zajac (2001) suggest that small boards might better facilitate strategic change. Although there is an evidence to the contrary (Boyd, 1990), it suggests that large boards are generally viewed as possessing a depth of expertise on which to draw strategic guidance. Directors bring benefits to the organization including information, access to channels, access to resources, and legitimacy (Pfeffer and Salancik, 1978). Furthermore, resource dependence theory suggests that larger boards help to better link an organization with its environment to minimize environmental dependence, (Hillman et al., 2009). Therefore, they are associated with a firm's ability to obtain external financing particularly in times of resource scarcity (Valenti and Schneider, 2014).

Accordingly, it is reasoned that while good governance board characteristics including large board size, associated with vigilant oversight may represent best practice in stable state conditions, these same characteristics can inhibit managerial discretion and limit their capacity to respond to the contingencies of a financial crisis with harmful effects for a firm's financial performance (Essen et al., 2013). In the context of the crisis, it is expected to be a performance disadvantage in firms that have vigilant boards (those characterized by larger boards).

H1: Vigilant boards characterized by larger boards have a negative impact on stock picking and market timing abilities of the Egyptian mutual fund managers during a financial crisis.

Proportion of independent directors and inside directors: Board composition has long been viewed as an important determinant of board effectiveness (Lorsch and Maclver, 1989). Research has largely focused on whether outsider - or insider - dominated boards have a greater influence on corporate strategy, with somewhat mixed results (Johnson et al., 1996). Firms whose boards are comprised of mostly outsiders have been found to be more likely to initiate strategic changes such as corporate restructuring. An alternative perspective suggests that inside directors might provide better strategic direction than outsiders, given their understanding of their firm's operations, customers, and business model (Bruni-Bossio and Sheehan, 2013). In addition, their inside information can enhance top management commitment to pursue more risky, yet potentially profitable investments (Baysinger et al., 1991). Further, given the scarcity of credit in the years immediately following the crisis, the influence of inside directors to initiate strategic changes might have become more pronounced (Valenti and Schneider, 2014, Anderson et al., 2004).

During the crisis period, transparent reporting implies the timely recognition of losses related to subprime mortgages (Erkens et al., 2012). Because the recognition of losses led to lower capital adequacy ratios, firms have to resort to raising equity capital to avoid regulatory intervention. Raising equity capital, however, is very costly; it could have led to worse stock returns during the crisis because it causes a wealth transfer from existing equity holders to debt holders (Myers, 1977). Similarly, Aggarwal et al. (2007) contend that boards comprising a high ratio of independent directors have an information disadvantage compared with insiders and are typically slow to react in situations of adversity.

H2: Vigilant boards comprising a high proportion of independent directors have a negative impact on stock picking and market timing abilities of the Egyptian mutual fund managers during a financial crisis.

As indicated before, proportion of independent directors is negatively associated with fund performance during the crisis. Therefore, lower performance might lead to decreasing the level of corporate governance index.
H3: Vigilant boards comprising a high proportion of independent directors have a negative impact on corporate governance index of the fund management company during a financial crisis.

Director's background: Grace et al. (1995) find that there is no association between board composition which consists of a majority of non-executive directors and performance. Similarly, Gottesman and Morey (2010) argue that there is no significant correlation between the education of the CEO and performance. On the contrary, Brickley et al. (1994) find the results of their study to be driven by the proportion of professional independent directors. They find professional directors having the greatest positive coefficient (0. 085) of the four types, and the only one that is individually significant.
H4: There is a positive relation between proportion of professional directors on the board and stock picking and market timing abilities of the Egyptian mutual fund managers during the financial crisis.
As indicated before, the proportion of professional directors is positively associated with fund performance during the crisis. Therefore, higher performance might lead to increasing the level of corporate governance index.
H5: There is a positive relation between the proportion of professional directors on the board and corporate governance index of the fund management company during the financial crisis.

Board committee structure: in the steady state, board vigilance serves to mitigate the agency costs resulting from the separation of ownership and control (Jensen and Meckling, 1976). As indicated before, characteristic good governance prescriptions regarding vigilance include the independence of directors (Essen et al., 2012), large board size, frequent board meetings (Grove et al., 2011), and an active array of specialized committees. For instance, Bruno and Claessens (2010) find that the presence and independence of four functional committees (audit, nomination, compensation, and governance) have a positive impact on firm value.

Although the value of vigilant board oversight and the managerial discretion literature suggest that excessive monitoring and frequent interference in a firm's affairs may discourage managerial initiatives and harm firm value, similarly in the context of the crisis, there might be corporate governance disadvantages in firms that have vigilant boards (those characterized by presence of functional committees) (Essen et al., 2013).
H6: Vigilant boards comprising a high proportion of directors in the investment committee have a negative impact on corporate governance index of the fund management company during the financial crisis.

Equity ownership by directors: Mehran (1995) argues that that there is a positive correlation between the proportion of equity held by managers and firm performance. Similarly, this variable is included to examine if equity ownership by directors supports their fulfillment of shareholder interests, equity ownership by each director is reported within one of five EGP ranges. Similar to Ferris and Yan (2007), the proportion of directors holding zero shares is used as the measure of equity ownership by directors rather than the proportion of directors holding more than EGP 100,000 (or any other EGP range) because holding zero shares of the funds are strongly revealing of the absence of any incentive for the fund directors.

Erkens et al. (2012) include the percentage of shares held by insiders to control for ownership characteristics that are potentially correlated with the level of institutional ownership and the presence of large shareholders. Their conclusion on the relation between crisis-period performance and corporate governance is not sensitive to controlling for ownership characteristics. In the normal circumstances, institutional shareholders will seek maximizing returns from their equity stake, and while they will closely monitor the returns, they will avoid active involvement in firms whose shares they hold. On the other hand, in the context of a crisis, institutional investors are known for pulling out of a stock very quickly if they are unhappy with the returns. Therefore, transactional investors are likely to seek liquidity and reallocate capital during the crisis (Park and Song, 2001).
H7: The proportion of directors holding zero shares has a positive impact on stock picking and market timing abilities of the Egyptian mutual fund managers during the financial crisis.

As indicated before, the proportion of directors holding zero shares is positively associated with fund performance during the crisis.
H8: The proportion of directors holding zero shares has a positive impact on corporate governance index of the fund management company during the financial crisis.

Number of funds overseen by the fund management company: similar to Ferris and Yan (2007), this variable is included in the regression which is motivated by the busyness hypothesis of Ferris et al. (2003). They show that there is no significant evidence that multiple board memberships harm firm value**.** In this analysis, this variable allows to investigate if the fund management company with multiple funds to monitor is either too busy to provide effective oversight or possessing prominent expertise as a director. Similarly, it is found that the fund management company with multiple boards provides prominent expertise as a director which might lead to increasing the level of corporate governance index.
H9: The number of funds overseen by the fund management company has a positive impact on corporate governance index of the fund management company during the financial crisis.

Director's tenure: Walters et al. (2007) find that there is a positive correlation between CEO tenure and performance at low to moderate levels of tenure, in the absence of a vigilant board.

Although there are very rare researches on the relation between director's tenure and fund performance during the financial crisis, this study believes it is an important factor, and it should have been examined. Furthermore, Finkelstein and Hambrick (1990) indicate that managerial team tenure has a profound influence on organizational outcomes such as strategic persistence, strategic conformity, and performance conformity. On the contrary, Del Guercio et al. (2003) note directors who are long-serving can lose their capability to stay independent and become less effective as representatives for the shareholder interests. Similar to them, it is suggested that the average tenure of directors has a negative impact on performance. As illustrated before, the proportion of directors holding zero shares is positively associated with performance because investors are likely to seek liquidity and reallocate capital during the crisis. Accordingly, the average tenure of directors has a negative impact on the proportion of directors holding zero shares during the crisis.

H10: There is a negative relation between the average tenure of directors and the proportion of directors holding zero shares during the crisis.

Corporate governance index: the international corporate governance literature demonstrates that an external governance mechanism is an important measure of corporate governance used to protect shareholder interests (López de Silanes et al., 1998). Similar to Erkens et al. (2012), the influence of corporate governance is explored on firm performance. This paper constructs a governance index using the annual reports of the companies and the companies' websites, based on the OECD Corporate Governance Principles April 2004 (EFSA). Similar to, Erkens et al. (2012) find that powerful mutual fund governance is positively correlated to mutual fund performance.

H11: There is a positive relation between the corporate governance index of the fund Management Company and stock picking and market timing abilities of the Egyptian mutual fund managers during a financial crisis.

In addition to the board structure variables that are discussed in this section, control variables which might influence fund performance are included in the regression analysis. The following discussion contains a brief description of control variables.

Time: the period of the study is the years (2004-2007) and (2009-2013) - due to data availability - that can affect the performance of the fund. Jones (2007) suggests that investors who wish to maximize return should start their search by looking for younger funds. Furthermore, Aggarwal and Jorion (2010) find powerful evidence of out-performance during the first two to three years of fund presence. Each additional year of age reduces performance by 42 basis points. Similar to Aggarwal and Jorion (2010), performance measurement needs to control for the usual biases afflicting mutual fund databases. This bias is controlled by using Time to investigate how mutual funds perform over time and what role time plays in performance. Based upon the previous discussion, there is a negative relation between the fund age – which increases over time –and fund performance. Accordingly, there is a negative relation between the time and fund performance.

Investment objective dummy variables: the type of investment objective a fund adopts affects the portfolio risk and return. Similar to Ferris and Yan (2007) and Tufano and Sevick (1997), a series of dummy variables is included to describe the investment objectives represented in the sample to take a value of 1 if the fund belongs to the same category under study and zero otherwise. The investment objectives represented in the sample are: Fund Obj1: Equity Fund, Fund Obj2: Balanced Fund, Fund Obj3: Islamic Fund Obj 4: Money Market Fund, and Fund Obj5: Others (Capital Guaranteed Fund, Asset Allocator Fund, Open End Income Mixed Fund, and Closed End Fund).

Standard deviation of the stock return: Agrawal and Knoeber (1996) include standard deviation of the mutual fund return in their analysis as one of the indicators of the cost arises from holding undiversified portfolio, and they find a negative association between the standard deviation of the stock return and the percentage of shares owned by directors. Similar to them, the standard deviation of the mutual fund return is included in model (B) only to control for the total risk because Perf2 (γ_i) which examines market timing is not a risk adjusted measure like Perf1 (α_i) which examines stock picking ability of the fund manager to avoid the unique risk of individual assets which is part of the total risk.

Financial crisis dummy variable: similar to Kaushik and Pennathur (2012) and Elmesseary (2014), a dummy variable (Dum_{fc}) is created to take a value of zero if the period is between January 2004 and December 2007, and one if the period is between January 2009 and December 2013. It is noted that the credit crunch did not really begin until the second wave which started in July 2007 (Ryan, 2008). Thus, the full model regression is run after using January 2008 as the start of the crisis period across two sub-periods: 'the Pre-Crisis period' and covers the four years of (2004-2007) and 'the Post-Crisis period' which covers the five years of (2009-2013). Finally, Table (1) summarizes the key studies in the previous literature that investigate the effect of board structure on stock picking and market timing.

Table 1. Empirical Analysis on the Effect of Board Structure on Stock Picking and Market Timing

Paper	Sample	Period	Performance Measure	Methodology	Relationship
Aggarwal et al. (2011)	1,556	2003–2008	ROA	OLS	Positive
Nguyen et al. (2015)	2,035	2006–2008	Q, Carhart (1997) four-factor model	OLS	Positive
Essen et al. (2013)	1,197	2005–2008	Cumulative stock return, abnormal return	OLS, HLM Analyses	Negative
Renders and Gaeremynck (2012)	300	1999–2003	Q	3SLS	Positive
Dowell et al. (2011)	227	2000–2002	Cash flow	OLS	Depends on firm and environmental context
Erkens et al. (2012)	296	2007–2008	Stock return, accounting writedown	OLS	Negative
Lassoued and Elmir (2012)	460	1995–2004	Optimal portfolio return	OLS	Positive
Cave et al. (2012)	259	2006-2008	Treynor and Mazuy (1966)	OLS	Positive
McNulty et al. (2013)	141	2008–2009	Financial slack, net cash	OLS	Positive

3. The Data

In this paper the sample for the study has been restricted to funds that their life-time exceeds six years (2008-2013) by the end of December 2013 in order to keep the funds that witnessed the FC using January 2008 as the start of the crisis period; this results in 35 diversified funds divided into two groups: by employing two market indexes (Jensen's alpha, and Treynor and Mazuy model) across two sub-periods: 'the Pre-Crisis period' and covers the four years of (2004-2007) and 'the Post-Crisis period' which covers the five years of (2009-2013). The sample is free from survivorship bias, since the sample includes both surviving and dead funds.

This paper uses secondary data only which is collected from the most recent available data from the Egyptian Stock Market, Central Bank of Egypt, EIMA, World Bank, EFSA, Misr for Central Clearing, Depository and Registry (MCDR), and National Bank of Egypt. The data is a panel data that tracks the performance of several mutual funds at several points in time 2004-2013.

The empirical analysis is carried out at different levels: (1) Jensen's Alpha model to measure to measure stock selection, and (2) Treynor and Mazuy (1966) to measure market timing. See, Table 2 providing a full set of variables of the study (Huber & Mellace, 2013). The results are based on a sample of 524 annual and semi-annual observations for 35 mutual funds from 2004 to 2013. See, Table 3 which includes three panels.

Table 2: Summary of Endogenous, Exogenous and Control Variables

Panel (A) Endogenous Variables

Variables	Measures	Source
Mutual funds financial performance ($Perf_{it}$)	$R_{it} - R_{ft} = \alpha_i + \beta_i \left(R_{mt} - R_{ft}\right) + \varepsilon_{it}$ $R_{it} - R_{ft} = \alpha_i + \beta_i \left(R_{mt} - R_{ft}\right) + \gamma_i \left(R_{mt} - R_{ft}\right)^{\wedge 2} + \varepsilon_{it}$	Calculated from mutual fund's prospectuses, mutual fund's financial statements, and economic review of Central Bank of Egypt. α_i and γ_i calculated using OLS regression.
Corporate governance index (CG_Q)	A constructed governance index calculated as an average of six governance indicators: (1) Effective Corporate Governance Framework (2) The rights of shareholders (3) The equitable treatment of shareholders (4) The role of stakeholders in corporate governance (5) Disclosure and transparency (6) The responsibilities of the board.	Calculated from the annual reports of the fund management companies and the companies' websites.

Panel (B) Exogenous Variables

Variables	Measures	Source
Board size (B_{Size})	The size of the board.	Board of director's annual reports of Egyptian mutual funds.
Proportion of independent directors (Ind_{Dir})	The number of independent directors on the board divided by board size.	Board of director's annual reports of Egyptian mutual funds.
Director's background (Fin_{Dir}) ($Prof_{Dir}$)	The directors' background. The number of directors with a background in finance or investment divided by board size. The number of directors who are retired or serve on several different boards as professional directors divided by board size.	Board of director's annual reports of Egyptian funds.
Board committee structure (Inv_{Comm}) (Aud_{Comm})	The number of directors on the investment committee divided by board size. The number of directors on the audit committee divided by board size.	Board of director's annual reports of Egyptian mutual funds.
Number of funds overseen by the fund management company (Dir_{Fn})	The number of funds overseen by the fund management company.	Board of director's annual reports of Egyptian mutual funds.
Director's tenure (Dir_{Tn})	The average number of years the firm's directors have served on the board either the fund management company board or any other boards.	Board of director's annual reports of Egyptian mutual funds.

Panel (C) Control Variables

Time ($Time$)	The years (2004 – 2007), and (2009-2013) due to data availability.	Sample Period.
Investment objective dummy variables ($Fund_{Obj}$)	This study uses dummy variables for the investment objectives represented in the sample to take a value of 1 if the fund belongs to the same category under study and zero otherwise.	Mutual fund prospectuses.
Standard Deviation of the Stock Return (σ_i)	The standard deviation of mutual fund returns.	Calculated with help of Microsoft Excel.
Financial Crisis dummy variable (Dum_{fc})	This study uses a dummy variable to take a value of zero if the period is between January 2004 and December 2007 and one if the period is between January 2009 and December 2013.	Sample Period.

Table 3: Descriptive Statistics of Board Structure and Fund Performance
Panel A: Fund and Governance Descriptive Statistics

	Model A Number of obs = 524					Model B Number of obs = 524			
Variable	Mean	Std. Dev.	Min	Max		Mean	Std. Dev.	Min	Max
Perf1	0.0018	0.0022	-0.0030	0.0120					
Perf2						-0.7491	1.6523	-10.6490	2.0760
CGQ	0.5929	0.1686	0.3333	0.8333		0.5929	0.1686	0.3333	0.8333
DirOwn	0.8489	0.2356	0.0000	1.0000		0.8489	0.2356	0.0000	1.0000
Time	2008.00	2.8710	2004.00	2013.00		2008.00	2.8710	2004.00	2013.00
Dump	0.5134	0.5003	0.0000	1.0000		0.5134	0.5003	0.0000	1.0000
Dumfc	0.6107	0.4881	0.0000	1.0000		0.6107	0.4881	0.0000	1.0000
FundObj1	0.4466	0.4976	0.0000	1.0000		0.4466	0.4976	0.0000	1.0000
FundObj2	0.1412	0.3486	0.0000	1.0000		0.1412	0.3486	0.0000	1.0000
FundObj3	0.0992	0.2993	0.0000	1.0000		0.0992	0.2993	0.0000	1.0000
FundObj4	0.1508	0.3582	0.0000	1.0000		0.1508	0.3582	0.0000	1.0000
DirTn	19.8817	6.2022	6.0000	29.0000		19.8817	6.2022	6.0000	29.0000
DirFn	10.3092	5.0440	1.0000	15.0000		10.3092	5.0440	1.0000	15.0000
AudComm	0.2771	0.1112	0.0909	0.4286		0.2771	0.1112	0.0909	0.4286
InvComm	0.1684	0.1170	0.0833	0.5455		0.1684	0.1170	0.0833	0.5455
ProfDir	0.4152	0.3176	0.0909	1.0000		0.4152	0.3176	0.0909	1.0000
FinDir	0.3412	0.2218	0.0909	0.8000		0.3412	0.2218	0.0909	0.8000
BSize	9.3989	3.0888	3.0000	16.0000		9.3989	3.0888	3.0000	16.0000
IndDir	0.8165	0.2362	0.0000	1.0000		0.8165	0.2362	0.0000	1.0000
StdDev i						0.0204	0.0134	0.0001	0.0602

Panel B: Pearson Correlations (Model A)

Variable	Time	Dump	Perf1	BSize	IndDir	AudComm	InvComm	DirOwn	DirFn	DirTn	FinDir	ProfDir	CGQ
Time	1.0000												
Dump	0.0342	1.0000											
Perf1	-0.5360	-0.0492	1.0000										
BSize	-0.0816	-0.0103	0.1178	1.0000									
IndDir	0.1911	0.0119	0.0144	0.2069	1.0000								
AudComm	0.0658	-0.0122	0.1347	-0.2219	-0.0196	1.0000							
InvComm	-0.1344	0.0125	-0.1060	-0.0602	-0.3173	-0.4502	1.0000						
DirOwn	0.0667	-0.0029	0.0912	0.6869	0.6893	-0.2432	-0.0984	1.0000					
DirFn	0.0959	-0.0062	0.1606	0.2286	0.4722	0.6850	-0.6540	0.2944	1.0000				
DirTn	-0.0603	-0.0186	0.1496	0.5535	0.0743	-0.2392	-0.1463	0.3105	0.2017	1.0000			
FinDir	-0.0609	-0.0004	0.0876	0.4899	-0.0726	-0.1785	-0.1391	0.0625	-0.0320	0.4064	1.0000		
ProfDir	-0.0224	0.0037	0.0991	0.4874	0.0780	-0.0458	-0.2230	0.1079	0.1365	0.3690	0.9751	1.0000	
CGQ	0.1047	0.0042	0.1193	0.3681	0.2932	0.6009	-0.4807	0.2694	0.6789	-0.0468	0.4297	0.5680	1.0000

Panel C: Pearson Correlations (Model B)

	Time	Dump	Perf2	StdDev i	BSize	IndDir	AudCom m	InvCom m	DirOw n	DirFn	DirTn	FinDi r	ProfDi r	CGQ
Time	1.0000													
Dump	0.0342	1.0000												
Perf2	0.2995	0.1430	1.0000											
StdDev i	-0.0002	-0.0964	0.0489	1.0000										
BSize	-0.0816	-0.0103	-0.0911	0.1477	1.0000									
IndDir	0.1911	0.0119	0.0365	0.1461	0.2069	1.0000								
AudCom m	0.0658	-0.0122	-0.0392	0.3040	-0.2219	-0.0196	1.0000							
InvComm	-0.1344	0.0125	0.0566	-0.3502	-0.0602	-0.3173	-0.4502	1.0000						
DirOwn	0.0667	-0.0029	-0.0525	0.1835	0.6869	0.6893	-0.2432	-0.0984	1.0000					
DirFn	0.0959	-0.0062	-0.0628	0.3720	0.2286	0.4722	0.6850	-0.654	0.2944	1.0000				
DirTn	-0.0603	-0.0186	-0.1100	0.0832	0.5535	0.0743	-0.2392	-0.1463	0.3105	0.2017	1.0000			
FinDir	-0.0609	-0.0004	-0.0466	-0.0515	0.4899	-0.0726	-0.1785	-0.1391	0.0625	-0.0320	0.4064	1.0000		
ProfDir	-0.0224	0.0037	-0.0375	-0.0051	0.4874	0.0780	-0.0458	-0.2230	0.1079	0.1365	0.3690	0.9751	1.0000	
CGQ	0.1047	0.0042	-0.0347	0.2774	0.3681	0.2932	0.6009	-0.4807	0.2694	0.6789	-0.0468	0.4297	0.568	1.0000

Panel A provides main fund and governance statistics for the overall sample. Included are the mean, standard deviation, minimum, and maximum of the variables used in the analysis for the two models (A), and (B). Perf1, and Perf2, for the overall sample, have mean values of, 0.18%, and -74%, respectively. Their mean values, however, vary somewhat more with Perf2 having lower mean value than Perf1 (about 74.18%). These

differences in the mean values are driven by the divergence between Perf1 (alpha, which represents a measure of stock picking ability of the fund manager), and Perf2 (gamma, which denotes the presence of market-timing ability). For the overall sample, all variables used in the analysis except (Perf1, and Perf2) for the two models (A), and (B) have similar mean, standard deviation, minimum, and maximum values.

For the overall sample, on average, the board structure is comprised of nine directors, and about 81% of them are independent directors. The board composition, on average, consists of 27% of directors on the audit committee, and 16% of directors on the investment committee. The board of directors, on average, includes 34% financial directors, and 41% professional directors. The average tenure of directors is 19 years. In terms of director ownership, about 84% of directors hold zero shares. Furthermore, the corporate governance index, on average, is 59%. The number of funds overseen by the fund management company, on average, is ten mutual funds per company. Furthermore, the major funds in the sample belong to open end equity fund.

Panel B provides the correlations between all variables included in model (A). Perf1 is positively correlated with BSize, IndDir, AudComm, DirOwn, DirFn, DirTn, FinDir, ProfDir, and CGQ and negatively correlated with InvComm. BSize exhibits the same pattern and is positively correlated with IndDir, DirOwn, DirFn, DirTn, FinDir, ProfDir, and CGQ and negatively correlated with InvComm. IndDir exhibits the same pattern and is positively correlated with DirOwn, DirFn, DirTn, ProfDir, and CGQ and negatively correlated with InvComm. AudComm exhibits the same pattern and is positively correlated with DirFn and CGQ and negatively correlated with InvComm. DirOwn exhibits the same pattern and is positively correlated with DirFn, DirTn, FinDir, ProfDir, and CGQ. DirFn exhibits the same pattern and is positively correlated with DirTn, Prof Dir, and CGQ. DirTn exhibits the same pattern and is positively correlated with FinDir, and ProfDir. FinDir exhibits the same pattern and is positively correlated with ProfDir, and CGQ. Finally, ProfDir exhibits the same pattern and is positively correlated with CGQ.

Interestingly, the correlations for Perf1, BSize, and IndDir are positive for DirOwn suggesting that vigilant boards are associated with a high fraction of directors holding zero shares. Furthermore, the correlations for BSize, IndDir, AudComm, DirOwn, DirFn, FinDir, and ProfDir are positive for Perf1, and CGQ suggesting that vigilant boards are associated with a higher performance, and a higher corporate governance index.

Panel C provides the correlations between all variables included in model (B). Perf2 is positively correlated with StdDev i, IndDir, and InvComm, and negatively correlated with Bsize, AudComm, DirOwn, DirFn, DirTn, FinDir, ProfDir, and CGQ. StdDev i exhibits the same pattern and is positively correlated with IndDir, and negatively correlated with FinDir, and ProfDir. Bsize exhibits the same pattern and is positively correlated with IndDir and negatively correlated with AudComm. IndDir exhibits the same pattern and is negatively correlated with AudComm, FinDir. AudComm exhibits the same pattern and is negatively correlated with DirOwn, DirTn, FinDir, and ProfDir. InvComm exhibits the same pattern and is negatively correlated with DirOwn, DirFn, DirTn, FinDir, ProfDir, and CGQ. DirFn exhibits the same pattern and is negatively correlated with FinDir. Finally, DirTn exhibits the same pattern and is negatively correlated with CGQ.

As indicated before in model (A), the correlations for BSize and IndDir are positive for DirOwn suggesting that vigilant boards (those characterized by a high fraction of independent directors, and the presence and independence of functional committees) are associated with a high fraction of directors holding zero shares. Furthermore, the correlations for BSize, IndDir, AudComm, DirOwn, DirFn, FinDir, and ProfDir are positive for CGQ suggesting that vigilant boards are associated with a higher corporate governance index. Additionally, the correlations for IndDir and InvComm are positive for Perf2 suggesting that vigilant boards are associated with a higher performance.

Overall, the results of the descriptive statistics are consistent with agency theory (e.g., Jensen and Murphy, 1990), and the law and finance (e.g., López de Silanes et al., 1998) literatures suggest that firm good governance characteristics, including an independent and vigilant board, will enhance corporate value and firm performance (Essen et al., 2013).

Similar to (Ferris and Yan, 2009) and (Essen et al., 2013), it is suggested that there is potential endogeneity between internal governance measures and financial risk management – measured by stock selection and market timing abilities of the fund managers – during the financial crisis because the prior board structure may affect current performance. Therefore, this potential endogeneity is examined in a structural equation model below.

4. Structural Equation Modelling Analysis

SEM is adapted from (Erkens et al., 2012), (Adams, 2012) and (Agrawal and Knoeber, 1996). To test the effect of board composition on mutual fund performance, this study uses the SEM technique through the following three stages: model specification, model estimation, and goodness of fit indices, which will be discussed respectively in the ensuing sections.

4.1 Structural Model Specification

For the analysis of the effect of board structure on mutual fund performance, this study evaluates the previous hypotheses. To test this assertion, a simultaneous equation system is utilized, where fund performance, corporate governance index, and director ownership are endogenous variables by using the following structural equation model**:**

$$\begin{aligned}\mathrm{Perf_{it}} = {} & \alpha_{it} + \alpha_1 (\mathrm{B_{Size}}) + \alpha_2 (\mathrm{Ind_{Dir}}) + \alpha_3 (\mathrm{Fin_{Dir}}) + \alpha_4 (\mathrm{Prof_{Dir}}) + \alpha_5 (\mathrm{Dir_{Tn}}) \\ & + \alpha_6 (\mathrm{CG_Q}) + \alpha_7 (\mathrm{Dir_{Own}}) + \alpha_8 (\mathrm{Inv_{Comm}}) + \alpha_9(\mathrm{Aud_{Comm}}) + \alpha_{10} (\mathrm{Dir_{Fn}}) \\ & + \alpha_{11} (\sigma_i) + \alpha_{12} (\mathrm{Time}) + \alpha_{13} (\mathrm{Dum_p}) \\ & + \alpha_{14}(\mathrm{Fund_{Obj1}}) \\ & + \alpha_{15} (\mathrm{Fund_{Obj2}}) + \alpha_{16} (\mathrm{Fund_{Obj3}}) + \alpha_{17} (\mathrm{Fund_{Obj4}}) + \alpha_{18} (\mathrm{Dum_{fc}}) \\ & + \varepsilon_{it}\end{aligned} \quad (1)$$

$$\begin{aligned}\mathrm{CG_Q} = {} & \beta_{it} + \beta_1 (\mathrm{B_{Size}}) + \beta_2 (\mathrm{Ind_{Dir}}) + \beta_3 (\mathrm{Fin_{Dir}}) + \beta_4 (\mathrm{Prof_{Dir}}) + \beta_5(\mathrm{Dir_{Tn}}) \\ & + \beta_6 (\mathrm{Dir_{Own}}) + \beta_7 (\mathrm{Inv_{Comm}}) \\ & + \beta_8(\mathrm{Aud_{Comm}}) + \beta_9 (\mathrm{Dir_{Fn}}) + \beta_{10}(\mathrm{Fund_{Obj1}}) \\ & + \beta_{11} (\mathrm{Fund_{Obj2}}) + \beta_{12} (\mathrm{Fund_{Obj3}}) + \beta_{13} (\mathrm{Fund_{Obj4}}) + \beta_{14} (\mathrm{Dum_{fc}}) + \varepsilon_{it}\end{aligned} \quad (2)$$

$$\begin{aligned}\mathrm{Dir_{Own}} = {} & \gamma_{it} + \gamma_1 (\mathrm{B_{Size}}) + \gamma_2 (\mathrm{Ind_{Dir}}) + \gamma_3 (\mathrm{Fin_{Dir}}) + \gamma_4 (\mathrm{Prof_{Dir}}) + \gamma_5(\mathrm{Dir_{Tn}}) \\ & + \gamma_6 (\mathrm{Dir_{Fn}}) + \gamma_7(\mathrm{Inv_{Comm}}) + \gamma_8(\mathrm{Aud_{Comm}}) + \gamma_9(\mathrm{Fund_{Obj1}}) \\ & + \gamma_{10} (\mathrm{Fund_{Obj2}}) + \gamma_{11} (\mathrm{Fund_{Obj3}}) + \gamma_{12} (\mathrm{Fund_{Obj4}}) + \gamma_{13} (\mathrm{Dum_{fc}}) + \varepsilon_{it}\end{aligned} \quad (3)$$

4.2 The Estimation Results

The results about the estimation of the structural model (A), (B) are presented in Table (4) which includes three panels for every model. The path diagram for the two models (A), and (B) is presented in Figure (1) and (2) respectively According to the previous, in testing the hypotheses, results reveal that there are eleven hypotheses in this study, and ten hypotheses i.e. H1, H2, H3, H4, H5, H6, H7, H8, H9, and H10 are statistically significant. Thus, these hypotheses are supported. While, one hypothesis i.e. H11 is found statistically not significant. Hence, this hypothesis is not supported.

Although the hypothesis is not supported, the result is consistent with Ebaid (2011) argument that the internal audit function in Egypt suffers from many weaknesses that affect negatively its effective role in corporate governance. Accordingly, corporate governance in Egypt, in its current status, has no significant effect on performance because corporate governance rules included in the Egypt Code of Corporate Governance: Guidelines and Standards are not mandatory and lack legislative force (Sharma et al., 2008). Additionally, the result is consistent with Erkens et al. (2012) argument that the coefficients of the country-level governance variables are insignificant.

Table 4. Path Coefficients - Whole Sample (p value of the t tests in parentheses)

	Model (A)		**Model (B)**		
	(1)	**(2)**	**(3)**	**(4)**	
Panel A: The Effect of Board Structure on Mutual Fund Performance					
Perf					
CGQ	-0.0020	(0.294)	-1.0160	(0.512)	
Dir Own	0.0059***	(0.001)	-0.3951	(0.782)	
Time	-0.0004***	(0.000)	-0.1542***	(0.001)	
Dump	-0.0001	(0.652)	0.5075***	(0.000)	
Dumfc	0.0001	(0.779)	2.1023***	(0.000)	
Fund Obj1	0.0008*	(0.019)	-1.1125***	(0.000)	
Fund Obj2	-0.0001	(0.899)	-0.4250	(0.224)	
Fund Obj3	0.0004	(0.339)	-1.0893**	(0.002)	
Aud Comm	0.0001	(0.980)	1.1127	(0.544)	
Inv Comm	-0.0002	(0.878)	-0.8483	(0.417)	
B Size	-0.0003***	(0.000)	0.0669	(0.341)	
Ind Dir	-0.0049**	(0.008)	0.6582	(0.663)	

Dir Tn	0.0000	(0.182)	-0.0058	(0.825)	
Dir Fn	0.0000	(0.975)	-0.0782	(0.073)	
Fin Dir	-0.0183*	(0.020)	-2.4791	(0.701)	
Prof Dir	0.0144**	(0.010)	1.9437	(0.671)	
Fund Obj4	-0.0014***	(0.001)	1.1185**	(0.002)	
StdDev i			52.5244***	(0.000)	
Constant	0.8764***	(0.000)	307.5198***	(0.001)	
Panel B: The Effect of Board Structure on Corporate Governance Index					
CGQ					
Dir Own	0.2890***	(0.000)	0.2890***	(0.000)	
Dumfc	0.0109**	(0.002)	0.0109**	(0.002)	
Fund Obj1	0.0633***	(0.000)	0.0633***	(0.000)	
Fund Obj2	0.0495***	(0.000)	0.0495***	(0.000)	
Fund Obj3	0.0819***	(0.000)	0.0819***	(0.000)	
Aud Comm	0.5766***	(0.000)	0.5766***	(0.000)	
Inv Comm	-0.1399***	(0.000)	-0.1399***	(0.000)	
B Size	0.0033	(0.099)	0.0033	(0.099)	
Ind Dir	-0.2194***	(0.000)	-0.2194***	(0.000)	
Dir Tn	-0.0114***	(0.000)	-0.0114***	(0.000)	
Dir Fn	0.0079***	(0.000)	0.0079***	(0.000)	
Fin Dir	-0.4345*	(0.016)	-0.4345*	(0.016)	
Prof Dir	0.6271***	(0.000)	0.6271***	(0.000)	
Fund Obj4	0.0825***	(0.000)	0.0825***	(0.000)	
Constant	0.3309***	(0.000)	0.3309***	(0.000)	
Panel C: The Effect of Board Structure on Director Ownership					
Dir Own					
Dumfc	0.0033	(0.421)	0.0033	(0.421)	
Fund Obj1	0.1110***	(0.000)	0.1110***	(0.000)	
Fund Obj2	0.1815***	(0.000)	0.1815***	(0.000)	
Fund Obj3	0.1062***	(0.000)	0.1062***	(0.000)	
Aud Comm	0.5234***	(0.000)	0.5234***	(0.000)	
Inv Comm	0.3174***	(0.000)	0.3174***	(0.000)	
B Size	0.0462***	(0.000)	0.0462***	(0.000)	
Ind Dir	0.9846***	(0.000)	0.9846***	(0.000)	
Dir Tn	-0.0087***	(0.000)	-0.0087***	(0.000)	
Dir Fn	0.0126***	(0.000)	0.0126***	(0.000)	
Fin Dir	3.7165***	(0.000)	3.7165***	(0.000)	
Prof Dir	-2.6595***	(0.000)	-2.6595***	(0.000)	
Fund Obj4	0.1192***	(0.000)	0.1192***	(0.000)	
Constant	-0.8138***	(0.000)	-0.8138***	(0.000)	
var(e.Perf1)					
Constant	0.0000***	(0.000)			
var(e.CGQ)					
Constant	0.0014***	(0.000)	0.0014***	(0.000)	
var(e.DirOwn)					
Constant	0.0019***	(0.000)	0.0019***	(0.000)	
var(e.Perf2)					
Constant			1.8104***	(0.000)	
Observations	524		524		

Note: This table provides results from SEM of the effect of board structure on performance pre and post the financial crisis for the sample of 35 funds from (2004-2007) and (2009-2013). A robust t-statistics test is conducted, and p-values are in parentheses. Columns (2) and (4) provide p-values. Columns (1) and (3) present the path coefficients for the two models. * Statistical significance at 10% level. ** Statistical significance at 5% level. *** Statistical significance at 1% level.

Figure 1. Path Diagram - Whole Sample - for Structural Equation Model (A)

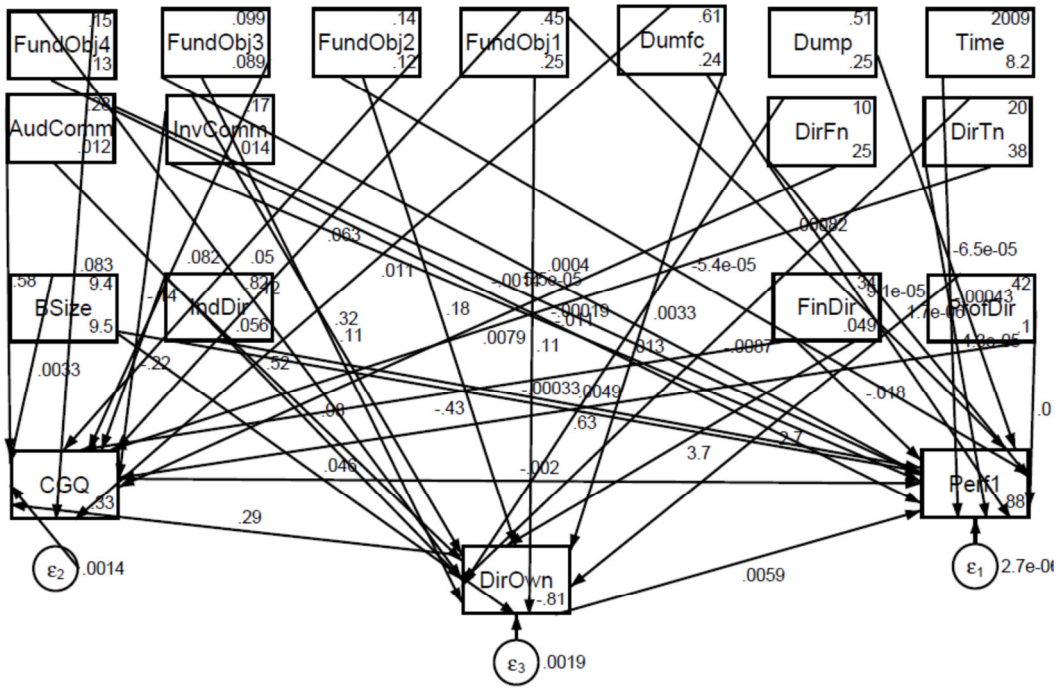
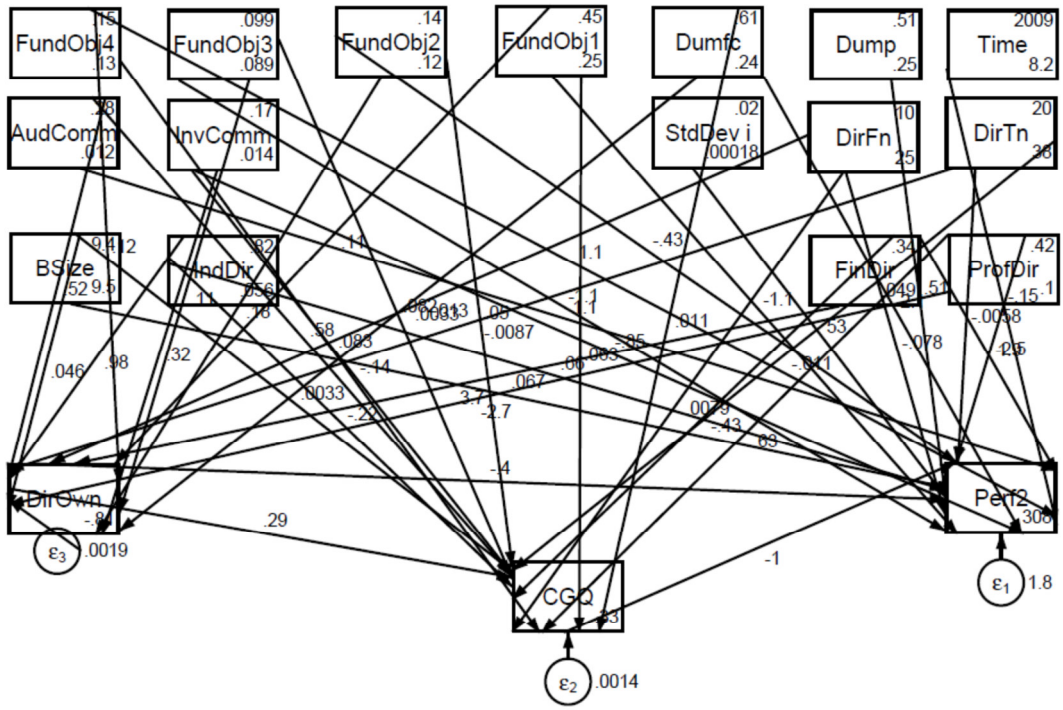


Figure 2. Path Diagram -Whole Sample - for Structural Equation Model (B)



The Direct, Indirect and Total Effects

Table (5) demonstrates direct, and indirect effects among all variables in the Structural Equation Model. It includes three panels (A), (B), and (C) respectively.

Table 5. Summary of Direct and Indirect Effects of Structural Equation Model

Direct Effects					**Indirect Effects**				
	Model A		**Model B**			**Model A**		**Model B**	
	(1)	**(2)**	**(1)**	**(2)**		**(1)**	**(2)**	**(1)**	**(2)**
Panel A: The Effect of Board Structure on Mutual Fund Performance									
Perf					**Perf**				
CGQ	-0.0020	0.294	-1.0160	0.512	CGQ				
DirOwn	0.0059	0.001	-0.3951	0.782	DirOwn	-0.0006	0.000	-0.2937	0.000
Time	-0.0004	0.000	-0.1542	0.001	Time				
Dump	-0.0001	0.652	0.5075	0.000	Dump				
Dumfc	0.0001	0.779	2.1023	0.000	Dumfc	-4.10E-06	0.895	-0.0133	0.460
FundObj1	0.0008	0.019	-1.1125	0.000	FundObj1	0.0005	0.036	-0.1408	0.434
FundObj2	-0.0001	0.899	-0.4250	0.224	FundObj2	0.0009	0.006	-0.1753	0.497
FundObj3	0.0004	0.339	-1.0893	0.002	FundObj3	0.0004	0.091	-0.1564	0.416
FundObj4	-0.0014	0.001	1.1185	0.002	FundObj4	0.0005	0.064	-0.1659	0.421
DirTn	0.0000	0.182	-0.0058	0.825	DirTn	0.0000	0.360	0.0176	0.408
DirFn	0.0000	0.975	-0.0782	0.073	DirFn	0.0001	0.051	-0.0167	0.428
AudComm	0.0001	0.980	1.1127	0.544	AudComm	0.0016	0.242	-0.9463	0.408
InvComm	-0.0002	0.878	-0.8483	0.417	InvComm	0.0020	0.001	-0.0765	0.874
ProfDir	0.0144	0.010	1.9437	0.671	ProfDir	-0.0154	0.001	1.1945	0.749
FinDir	-0.0183	0.020	-2.4791	0.701	FinDir	0.0207	0.001	-2.1181	0.677
BSize	-0.0003	0.000	0.0669	0.341	BSize	0.0002	0.002	-0.0351	0.576
IndDir	-0.0049	0.008	0.6582	0.663	IndDir	0.0057	0.001	-0.4552	0.741
StdDev i			52.5244	0.000	StdDev i				
Panel B: The Effect of Board Structure on Corporate Governance Index									
CGQ					**CGQ**				
DirOwn	0.2890	0.000	0.2890	0.000	DirOwn				
Dumfc	0.0109	0.002	0.0109	0.002	Dumfc	0.0009	0.423	0.0009	0.423
FundObj1	0.0633	0.000	0.0633	0.000	FundObj1	0.0321	0.000	0.0321	0.000
FundObj2	0.0495	0.000	0.0495	0.000	FundObj2	0.0525	0.000	0.0525	0.000
FundObj3	0.0819	0.000	0.0819	0.000	FundObj3	0.0307	0.000	0.0307	0.000
FundObj4	0.0825	0.000	0.0825	0.000	FundObj4	0.0345	0.000	0.0345	0.000
DirTn	-0.0114	0.000	-0.0114	0.000	DirTn	-0.0025	0.000	-0.0025	0.000
DirFn	0.0079	0.000	0.0079	0.000	DirFn	0.0036	0.000	0.0036	0.000
AudComm	0.5766	0.000	0.5766	0.000	AudComm	0.1513	0.000	0.1513	0.000
InvComm	-0.1399	0.000	-0.1399	0.000	InvComm	0.0917	0.000	0.0917	0.000
ProfDir	0.6271	0.000	0.6271	0.000	ProfDir	-0.7687	0.000	-0.7687	0.000
FinDir	-0.4345	0.016	-0.4345	0.016	FinDir	1.0742	0.000	1.0742	0.000
BSize	0.0033	0.099	0.0033	0.099	BSize	0.0133	0.000	0.0133	0.000
IndDir	-0.2194	0.000	-0.2194	0.000	IndDir	0.2846	0.000	0.2846	0.000
Panel C: The Effect of Board Structure on Director Ownership									
DirOwn					**DirOwn**				
Dumfc	0.0033	0.421	0.0033	0.421	Dumfc				
FundObj1	0.1110	0.000	0.1110	0.000	FundObj1				
FundObj2	0.1815	0.000	0.1815	0.000	FundObj2				
FundObj3	0.1062	0.000	0.1062	0.000	FundObj3				
FundObj4	0.1192	0.000	0.1192	0.000	FundObj4				
DirTn	-0.0087	0.000	-0.0087	0.000	DirTn				
DirFn	0.0126	0.000	0.0126	0.000	DirFn				
AudComm	0.5234	0.000	0.5234	0.000	AudComm				
InvComm	0.3174	0.000	0.3174	0.000	InvComm				
ProfDir	-2.6595	0.000	-2.6595	0.000	ProfDir				
FinDir	3.7165	0.000	3.7165	0.000	FinDir				
BSize	0.0462	0.000	0.0462	0.000	BSize				
IndDir	0.9846	0.000	0.9846	0.000	IndDir				

Note: This table provides summary of direct, indirect, and total effects from SEM of the effect of board structure on stock picking and market timing abilities of the Egyptian mutual fund managers pre and post the financial crisis for the sample of 35 funds from (2004-2007) and (2009-2013).

Panel A: The Effect of Board Structure on Mutual Fund Performance

Panel (A) demonstrates several significant direct, indirect, and total effects. Firstly, DirOwn, ProfDir, FinDir, BSize, and IndDir have significant direct influence on Perf1. Secondly, DirOwn, ProfDir, FinDir, BSize, and IndDir have significant indirect influence on Perf1 through the mediating effect of CGQ (DirOwn→ CGQ→

Perf1, ProfDir→ CGQ→ Perf1, FinDir→ CGQ→ Perf1, BSize → CGQ→ Perf1, and IndDir→ CGQ→ Perf1). Finally, DirOwn and BSize have significant total influence on Perf1. The Structural Equation Model indicates that evaluation of total effects on the determination of Perf1 arise from the combination of direct and indirect effects of the variables in the model.

As indicated previously, all the path coefficients which have significant direct, and significant indirect effect on Perf1 have also a significant total effect on Perf1 except three coefficients ProfDir, FinDir, and IndDir. Because ProfDir has a positive significant direct effect on Perf1 (0.0144) followed by a negative significant and moderate effect by CGQ (-0.0154) which lead to negative insignificant total effect on Perf1 (-0.0010), FinDir has a negative significant direct effect on Perf1 (-0.0183) followed by a positive significant and moderate effect by CGQ (0.0207) which lead to positive insignificant total effect on Perf1 (0.0024), and IndDir also has a negative significant direct effect on Perf1 (-0.0049) followed by a positive significant and moderate effect by CGQ (0.0057) which lead to positive insignificant total effect on Perf1 (0.0008).

Panel B: The Effect of Board Structure on Corporate Governance Index

Panel (B) demonstrates several significant direct, indirect, and total effects. Firstly, DirOwn, DirTn, DirFn, ProfDir, FinDir, AudComm, InvComm, and IndDir have a significant direct influence on CGQ. Secondly, DirTn, DirFn, ProfDir, FinDir, AudComm, InvComm, and IndDir have a significant indirect influence on CGQ through the mediating effect of DirOwn (ProfDir→ DirOwn→ CGQ,
FinDir→ DirOwn→ CGQ, DirTn→ DirOwn→ CGQ, DirFn→ DirOwn→ CGQ, AudComm→ DirOwn→ CGQ, InvComm→ DirOwn→ CGQ, and IndDir→ DirOwn→ CGQ). Finally, DirOwn, DirTn, DirFn, AudComm, FinDir, and IndDir have a significant total influence on CGQ. The Structural Equation Model indicates that evaluation of total effects on the determination of CGQ arises from the combination of direct and indirect effects of the variables in the model.

As indicated previously, all the path coefficients which have significant direct, and significant indirect effect on CGQ have also a significant total effect on CGQ, except two coefficients InvComm, and ProfDir. This is because InvComm has a negative significant direct effect on CGQ (-0.1399) followed by a positive significant and moderate effect by DirOwn (0.0917) which lead to negative insignificant total effect on CGQ (-0.0481), and ProfDir has a positive significant direct effect on CGQ (0.6271) followed by a negative significant and moderate effect by DirOwn (-0.7687) which lead to negative insignificant total effect on CGQ (-0.1416).

Panel C: The Effect of Board Structure on Ownership Structure

Panel (C) demonstrates several significant direct and total effects. Firstly, ProfDir, FinDir, BSize, DirFn, DirTn, InvComm, AudComm, and IndDir have a significant direct influence on DirOwn. Finally, ProfDir, FinDir, BSize, DirFn, DirTn, InvComm, AudComm, and IndDir have a significant total direct influence on DirOwn. The Structural Equation Model indicates that evaluation of total effects on the determination of DirOwn arises from the direct effects of the variables in the model only because there are no indirect effects of the variables in this model.

4.3 The Goodness of Fit

The fit indices shown in Table (6) indicate that the hypothesized structural model provides a good fit to the data. In this study, the (R-squared) values of the endogenous variables in Table (7) range from 0.46 and 0.96 and the overall (R-squared) value is 0.99 for model (A), the (R-squared) values range from 0.33 and 0.96 and the overall (R-squared) value is 0.99 for model (B), these values fall within the acceptable range compared with other studies in the area of financial management research.

Table 6. Structural Equation Model Fit Measure Assessment

	Model A	**Model B**	
Fit Statistics	**Value**	**Value**	**Description**
Likelihood ratio			
chi2_ms	2.515	4.308	model vs. saturated
p > chi2	0.642	0.635	
chi2_bs	3661.556	3549.059	baseline vs. saturated
p > chi2	0.000	0.000	
Population error			
RMSEA	0.000	0.000	Root mean squared error of approximation
90% CI, lower bound	0.000	0.000	
upper bound	0.053	0.047	
Pclose	0.936	0.963	Probability RMSEA <= 0.05
Information criteria			
AIC	-1622.152	1904.665	Akaike's information criterion
BIC	-1409.077	2122.001	Bayesian information criterion
Baseline comparison			
CFI	1.000	1.000	Comparative fit index
TLI	1.005	1.004	Tucker-Lewis index
Size of residuals			
SRMR	0.001	0.001	Standardized root mean squared residual
CD	0.999	0.999	Coefficient of determination

Note: This table provides summary of goodness of fit index.

Table 7. Summary of (R-squared)

Model A						
Dep vars	Fitted	Variance predicted	Residual	**R-squared**	Mc	mc2
Observed						
Perf1	5.03E-06	2.35E-06	2.68E-06	0.4678	0.6839	0.4678
CGQ	0.0284	0.0269	0.0014	0.9492	0.9743	0.9492
DirOwn	0.0554	0.0535	0.0019	0.9658	0.9828	0.9658
Overall				0.9990		

mc = correlation between Dep vars and its prediction
mc2 = mc^2 is the Bentler-Raykov squared multiple correlation coefficient

Model B						
Dep vars	fitted	Variance predicted	residual	**R-squared**	mc	mc2
Observed						
Perf2	2.7270	0.9166	1.8104	0.3361	0.5798	0.3361
CGQ	0.0284	0.0269	0.0014	0.9492	0.9743	0.9492
DirOwn	0.0554	0.0535	0.0019	0.9658	0.9828	0.9658
Overall				0.9988		

mc = correlation between Dep vars and its prediction
mc2 = mc^2 is the Bentler-Raykov squared multiple correlation coefficient

5. Conclusion

Achieving the aim of this study contributes to the finance literature at three levels, theoretical, methodological and empirical levels. At the theoretical level, firstly, integrating both the board structure and ownership structure

mechanisms contributes to the development of a comprehensive model of mutual fund governance. Unlike previous studies (Morck et al., 1988; Klein, 1998; Eisenberg et al., 1998), the theoretical model provides insights into the interrelationships between board structure, and ownership structure as fundamental determinants of stock picking and market timing of the Egyptian fund managers rather than investigating the effect of each of these mechanisms separately on stock picking and market timing of the Egyptian fund managers pre and post financial crisis. Secondly, achieving the aim of this study contributes to the finance literature through developing a structural equation model of mutual fund governance that addresses the possible interrelationships between mutual fund governance and stock picking and market timing of the Egyptian fund managers' pre and post financial crisis, based on integrating perspectives from the agency theory.

At the methodological level, unlike previous studies that have addressed that the relation between board characteristics and firm performance may be spurious because they are endogenously determined and use OLS, 2SLS, 3SLS to overcome this problem (Erkens et al., 2012; Coles et al., 2008; Bhagat and Black, 2002), this study has achieved the broad objective of developing sophisticated statistical techniques, i.e., structural equation model (SEM) using STATA MP v.13. SEM allows simultaneous evaluation of the sufficiency of the causal model that is proposed to investigate the determinants of mutual fund performance**.**

At the empirical level, this study finds that the inspection of the estimated coefficient for the path Dumfc→ Perf2 has the expected positive sign because after the financial crisis period (2009-2013), fund managers successfully forecast the market upswing and change the fund beta accordingly, and the fund would be performing better than otherwise. Therefore, fund managers can make market timing after the financial crisis (Treynor and Mazuy, 1966). Furthermore, this study finds that the inspection of the estimated coefficient for the path Dumfc→ CGQ in the two models has the expected positive sign because after the financial crisis period (2009-2013), fund managers are skilled in stock picking and market timing. They generate superior performance and successfully forecast the market upswing and change the fund beta accordingly, and the fund would be performing better than otherwise (Treynor and Mazuy, 1966), and good performance might lead to increasing the corporate governance index, and the result is also consistent with the previous result.

However, the study provides evidence of a negative association between independent directors and stock picking of the fund managers measured by Jensen (1968) model during the crisis. The study also provides evidence of a negative association between board size and stock picking of the fund managers measured by Jensen (1968) model during the crisis. Additionally, the study provides evidence of a negative association between equity ownership by directors and stock picking of the fund managers measured by Jensen (1968) model during the crisis. These findings are consistent with the previous literature during the crisis period (Hillman et al., 2009; Essen et al., 2013; and Erkens et al., 2012).

Unsurprisingly, the global financial crisis demonstrates the need to integrate behavioral finance into our economic and financial theories. The crisis could have been prevented. There would have been no foreclosures of homes financed by subprime mortgages if no subprime mortgages were allowed, and no failures of banks holding them. Therefore, we should take into consideration aspirations for houses, tradeoffs in crisis prevention (Shefrin and Statman, 2011).

For future research, the model in this study could be expanded to include more factors such as director compensation, because there is no data available for complex-level director compensation in the Egyptian mutual funds. Thus, this paper suggests that the Egyptian Stock Market should require funds to disclose the total director compensation by the complex rather than per fund. The availability of time series data on director compensation by the complex leads to higher quality compensation data for research on the relationship between compensation and performance.

This paper conclude that most of the hypothesized relationships are supported (e.g. BSize is negatively associated with Perf1, IndDir is negatively associated with Perf1 and CGQ, ProfDir is positively associated with Perf1 and CGQ, InvComm is negatively associated with CGQ, DirOwn is positively associated with Perf1 and CGQ, DirFn is positively associated with CGQ, and DirTn is negatively associated with DirOwn) and one is not supported (e.g. CGQ is not associated with Perf1, and Perf2). Additionally, this paper is consistent with (Kryzanowski and Mohebshahedin, 2016) that closed end fund board size is negatively related to benchmark-adjusted returns, because larger boards are less effective in monitoring (Jensen, 1993; Lipton and Lorsch, 1992).

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